|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **HVAC CALCULATION NOTE FOR EXTENSION OF EXISTING ELECT. BUILDING**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
|  | |  |  |  |  |  |  |
|  | |  |  |  |  |  |  |
| D02 | | JAN. 2023 | IFA | H.Adineh | M.Fakharian | M.Mehrshad |  |
| D01 | | SEP. 2022 | IFA | H.Adineh | M.Fakharian | M.Mehrshad |  |
| D00 | | JUN. 2022 | IFC | H.Adineh | M.Fakharian | M.Mehrshad |  |
| **Rev.** | | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 2** | | | **CLIENT Doc. Number:** **F0Z-708866** | | | | |
| **Status:** | | **IDC: Inter-Discipline Check**  **IFC: Issued For Comment**  **IFA: Issued For Approval**  **AFD: Approved For Design**  **AFC: Approved For Construction**  **AFP: Approved For Purchase**  **AFQ:** Approved For Quotation  **IFI: Issued For Information**  **AB-R: As-Built for CLIENT Review**  **AB-A: As-Built –Approved** | | | | | |

**REVISION RECORD SHEET**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
| **1** | X | X | X |  |  | **66** |  |  |  |  |  |
| **2** | X | X | X |  |  | **67** |  |  |  |  |  |
| **3** | X | X |  |  |  | **68** |  |  |  |  |  |
| **4** | X | X |  |  |  | **69** |  |  |  |  |  |
| **5** | X | X |  |  |  | **70** |  |  |  |  |  |
| **6** | X | X |  |  |  | **71** |  |  |  |  |  |
| **7** | X | X |  |  |  | **72** |  |  |  |  |  |
| **8** | X | X |  |  |  | **73** |  |  |  |  |  |
| **9** | X | X |  |  |  | **74** |  |  |  |  |  |
| **10** | X | X |  |  |  | **75** |  |  |  |  |  |
| **11** | X | X |  |  |  | **76** |  |  |  |  |  |
| **12** | X | X |  |  |  | **77** |  |  |  |  |  |
| **13** | X | X |  |  |  | **78** |  |  |  |  |  |
| **14** | X | X |  |  |  | **79** |  |  |  |  |  |
| **15** | X | X |  |  |  | **80** |  |  |  |  |  |
| **16** | X | X |  |  |  | **81** |  |  |  |  |  |
| **17** | X | X |  |  |  | **82** |  |  |  |  |  |
| **18** | X | X |  |  |  | **83** |  |  |  |  |  |
| **19** | X | X |  |  |  | **84** |  |  |  |  |  |
| **20** | X | X |  |  |  | **85** |  |  |  |  |  |
| **21** | X | X |  |  |  | **86** |  |  |  |  |  |
| **22** | X | X |  |  |  | **87** |  |  |  |  |  |
| **23** | X | X | X |  |  | **88** |  |  |  |  |  |
| **24** | X | X |  |  |  | **89** |  |  |  |  |  |
| **25** |  | X |  |  |  | **90** |  |  |  |  |  |
| **26** |  | X |  |  |  | **91** |  |  |  |  |  |
| **27** |  | X | X |  |  | **92** |  |  |  |  |  |
| **28** |  |  |  |  |  | **93** |  |  |  |  |  |
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| **49** |  |  |  |  |  | **114** |  |  |  |  |  |
| **50** |  |  |  |  |  | **115** |  |  |  |  |  |
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1. **INTRODUCTION**

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO).Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

**GENERAL DEFINITION**

The following terms shall be used in this document.

|  |  |
| --- | --- |
| CLIENT: | National Iranian South Oilfields Company (NISOC) |
| PROJECT: | Binak Oilfield Development – General Facilities |
| GENERAL CONTRACTOR (GC): | Petro Iran Development Company (PEDCO) |
| EPC CONTRACTOR: | Joint Venture of :Hirgan Energy – Design & Inspection(D&I) Companies |
| VENDOR: | The firm or person who will fabricate the equipment or material. |
| EXECUTOR: | Executor is the party which carries out all or part of construction and/or commissioning for the project. |
| THIRD PARTY INSPECTOR (TPI): | The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods. |
| SHALL: | Is used where a provision is mandatory. |
| SHOULD: | Is used where a provision is advisory only. |
| WILL: | Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR |
| MAY: | Is used where a provision is completely discretionary. |

1. **Scope**

This document covers minimum necessary requirements for basis of design and main equipment’s to be used for the Heating, Ventilating, Air-Conditioning and pressurizing and plumbing system for buildings for project

1. **NORMATIVE REFERENCES**

## Local Codes and Standards

* IPS Iranian petroleum standards
* INBC Iranian National Building Code

## International Codes and Standards

* ASTM American Society for Testing Materials Relevant Parts
* API 610 Centrifugal Pumps for General Refinery Service, 10th Edition
* ISO 15156 Petroleum and Natural Gas Industries. Materials for use in H2S Containing Environments in Oil and Gas

Production

* AMCA Air Movement and Control Association
* ANSI American National Standards Institute.
* ASHRAE American Society of Heating, Refrigeration and Air-conditioning Engineer
* ASTM American Society for Testing and Material
* BOCA Building Officials and Code Administrators international
* BS British Standards
* CIBSE Chartered Institute of Building Services Engineers.
* NFPA National fire protection association
* SBCCI Southern Building Code Congress International
* SMACNA Sheet Metal and Air Conditioning Contractors’ National Association
* AWWA [American Water Works Association](http://www.awwa.org/)
* ASME [The American Society of Mechanical Engineers](https://www.asme.org/)

Note: The latest issued or revised edition of all above mentioned codes and standards shall be considered as reference.

## ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No BK-GNRAL-PEDCO-000-PR-DB-0001 .

1. **Site Conditions**

The following information is related to Bandar Deylam and Genaveh.

## Site location

* + Latitude 30° 32’ N
  + Longitude 50° 17’ E
  + Elevation 10 m

## External design conditions (for HVAC design calculation)

* + Summer dry bulb temperature : 41° C
  + Summer wet bulb humidity : : 30.5 ° C
  + Summer daily range temperature : 15.0° C
  + Winter dry bulb temperature : 6.0° C
  + Winter relative humidity : 100%

Note1: Outdoor refrigeration equipment shall be designed to maintain design conditions with an

50 °C temperature.

1. **Internal design conditions**

BASED ON “HVAC DESIGN CRITERIA” DOC. NUMBER: BK-GNRAL-PEDCO-000-HV-DC-0001

| **Room** | **Min. Fresh Air**  **(Note 3)** | **Min. Exhaust** | **Room Temp**  **Winter/Summer**  **(Deg C)** | **Relative Humidity**  **Winter/ Summer**  **(Min/Max)%** | **Over Pressure Value (Pa)** | **Equipment Heat Gain**  **(Watts)** |
| --- | --- | --- | --- | --- | --- | --- |
| Extension of Existing Elec. Building |  |  |  |  |  |  |
| Co2 Room | - | 6 ACH | NC | NC | Negative | - |
| Capacitor Room | 1 ACH | - | 10/30 | 30/60 | Positive | See(13.3Design Criteria) |
| HV Room | 1 ACH | - | 10/30 | 30/60 | Positive | See(13.3Design Criteria) |
| LV Room | 1 ACH | - | 10/30 | 30/60 | Positive | See(13.3Design Criteria) |
| Battery Room | - | 10 ACH | NC | NC | Negative | - |

1. **HVAC CALCULATION**

## Design weather Parameters:

## Design Parameters:

City Name …………………………………………………………………………**binak**

Location **IRAN**

Latitude **30.3** Deg. Longitude **-50.2** Deg. Elevation **10.0** m Summer Design Dry-Bulb **41.0** °C Summer Coincident Wet-Bulb **30.5** °C Summer Daily Range **15.0** °K Winter Design Dry-Bulb **6.0** °C Winter Design Wet-Bulb **6.0** °C Atmospheric Clearness Number **1.00** Average Ground Reflectance **0.20**

Soil Conductivity **1.385** W/(m-°K) Local Time Zone (GMT +/- N hours) **-1.0** hours Consider Daylight Savings Time **No** Simulation Weather Data **none N/A**

Current Data is **User Modified**

Design Cooling Months **January to December**

## Design Day Maximum Solar Heat Gains

(The MSHG values are expressed in W/m² )

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Month** | **N** | **NNE** | **NE** | **ENE** | **E** | **ESE** | **SE** | **SSE** | **S** |
| January | 76.4 | 76.4 | 104.1 | 335.1 | 577.4 | 722.3 | 796.4 | 786.7 | 764.0 |
| February | 88.0 | 88.0 | 230.9 | 458.1 | 662.9 | 773.4 | 774.9 | 717.7 | 674.9 |
| March | 100.7 | 108.6 | 368.7 | 585.3 | 707.6 | 758.3 | 705.1 | 595.4 | 528.1 |
| April | 113.1 | 256.3 | 472.2 | 642.7 | 716.0 | 679.9 | 580.0 | 422.9 | 334.5 |
| May | 124.2 | 353.9 | 534.8 | 663.8 | 694.2 | 620.4 | 475.0 | 290.9 | 209.6 |
| June | 157.8 | 384.6 | 558.6 | 667.1 | 676.8 | 585.8 | 428.0 | 240.6 | 172.3 |
| July | 127.6 | 344.7 | 537.1 | 656.3 | 678.1 | 598.4 | 463.4 | 281.6 | 203.3 |
| August | 118.2 | 248.3 | 466.5 | 623.6 | 687.8 | 654.3 | 558.9 | 407.2 | 322.5 |
| September | 104.5 | 113.3 | 336.6 | 555.0 | 683.3 | 716.4 | 681.4 | 580.5 | 517.4 |
| October | 90.9 | 90.9 | 201.8 | 462.7 | 636.7 | 736.7 | 756.5 | 701.7 | 660.0 |
| November | 77.8 | 77.8 | 98.3 | 345.3 | 551.3 | 718.6 | 773.6 | 774.1 | 756.1 |
| December | 71.4 | 71.4 | 71.4 | 269.7 | 530.8 | 696.4 | 785.4 | 795.0 | 786.8 |
| **Month** | **SSW** | **SW** | **WSW** | **W** | **WNW** | **NW** | **NNW** | **HOR** | **Mult** |
| January | 789.5 | 796.9 | 721.1 | 569.2 | 354.1 | 83.2 | 76.4 | 579.3 | 1.00 |
| February | 722.0 | 781.4 | 766.3 | 669.5 | 467.5 | 224.5 | 88.0 | 702.0 | 1.00 |
| March | 596.6 | 704.4 | 761.1 | 720.6 | 569.4 | 368.1 | 116.6 | 809.9 | 1.00 |
| April | 421.4 | 576.3 | 689.2 | 714.5 | 631.4 | 476.0 | 257.9 | 863.7 | 1.00 |
| May | 289.5 | 470.8 | 624.0 | 691.1 | 655.0 | 542.6 | 355.7 | 877.6 | 1.00 |
| June | 238.3 | 421.9 | 590.9 | 670.1 | 656.4 | 565.4 | 389.3 | 873.7 | 1.00 |
| July | 278.1 | 456.2 | 609.2 | 671.7 | 644.3 | 540.2 | 353.4 | 863.9 | 1.00 |
| August | 405.5 | 554.8 | 664.2 | 689.2 | 610.9 | 463.3 | 256.0 | 845.0 | 1.00 |
| September | 580.7 | 681.6 | 714.0 | 684.8 | 554.4 | 333.4 | 114.2 | 785.9 | 1.00 |
| October | 698.5 | 750.4 | 744.7 | 624.3 | 458.7 | 216.5 | 90.9 | 693.3 | 1.00 |
| November | 770.3 | 775.6 | 718.6 | 559.7 | 335.4 | 103.0 | 77.8 | 579.1 | 1.00 |
| December | 796.5 | 774.3 | 701.4 | 517.9 | 296.9 | 71.4 | 71.4 | 527.6 | 1.00 |

## CONSTRUCTIONS U-VALUE:

**External Wall**

**Wall Details**

    Outside Surface Color   **Dark**

    Absorptivity   **0.900**

    Overall U-Value   **0.642** W/(m²-°K)

**Wall Layers Details (Inside to Outside)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| concrete | 300.000 | 2242.6 | 0.84 | 0.17334 | 672.8 |
| insulation | 50.000 | 32.0 | 0.92 | 1.13000 | 1.6 |
| face brick | 100.000 | 2002.3 | 0.92 | 0.07504 | 200.2 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **450.000** | **-** |  | **1.55766** | **874.6** |

**External Roof**

**Roof Details**

    Outside Surface Color   **Dark**

    Absorptivity   **0.900**

    Overall U-Value   **0.522** W/(m²-°K)

**Roof Layers Details (Inside to Outside)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| Concrete | 400.000 | 2242.6 | 0.84 | 0.23112 | 897.0 |
| board insulation | 50.000 | 32.0 | 0.92 | 1.13000 | 1.6 |
| Cement mortar | 50.800 | 640.7 | 0.84 | 0.29352 | 32.5 |
| Terrazo | 20.000 | 608.7 | 0.84 | 0.08000 | 12.2 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **520.800** | **-** |  | **1.91392** | **943.4** |

**Doors Input Data**

**1 x 2.5**

**Door Details:**

    Gross Area   **2.5** m²

    Door U-Value   **5.800** W/(m²-°K)

**Glass Details:**

    Glass Area   **0.0** m²

    Glass U-Value   **3.293** W/(m²-°K)

    Glass Shade Coefficient   **0.880**

    Glass Shaded All Day?   **No**

**1.2\*2.5**

**Door Details:**

    Gross Area   **5.0** m²

    Door U-Value   **5.800** W/(m²-°K)

**Glass Details:**

    Glass Area   **0.0** m²

    Glass U-Value   **3.293** W/(m²-°K)

    Glass Shade Coefficient   **0.880**

    Glass Shaded All Day?   **No**

**2\*2.5**

**Door Details:**

    Gross Area   **5.0** m²

    Door U-Value   **5.800** W/(m²-°K)

**Glass Details:**

    Glass Area   **0.0** m²

    Glass U-Value   **3.293** W/(m²-°K)

    Glass Shade Coefficient   **0.880**

    Glass Shaded All Day?   **No**

## SPACE INPUT DATA

**CAPACITOR BANK**

**1. General Details:**

    Floor Area   **33.0** m²

    Avg. Ceiling Height   **4.1** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **0.0** Person

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **None**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **10000.0** Watts

    Schedule   **Equipment**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| N | 32.0 | 0 | 0 | 0 |
| E | 20.0 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure N**

    Wall Type   **External Wall**

**3.2. Construction Types for Exposure E**

    Wall Type   **External Wall**

    Door Type   **1.2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 33.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **1.00** ACH

    Design Heating   **1.00** ACH

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **33.0** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **11.8** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **19.8** m²

    U-Value   **0.700** W/(m²-°K)

    Uncondit. Space Max Temp   **37.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **27.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

    Partition Type   **Wall Partition**

    Area   **32.0** m²

    U-Value   **0.700** W/(m²-°K)

    Uncondit. Space Max Temp   **28.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **25.0** °C

    Ambient at Space Min Temp   **6.0** °C

**HV ROOM**

**1. General Details:**

    Floor Area   **147.0** m²

    Avg. Ceiling Height   **4.1** m

    Building Weight   **318.6** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **332.7** L/s

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **1000** W

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **0.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **14000.0** Watts

    Schedule   **Equipment**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| N | 48.0 | 0 | 0 | 0 |
| E | 25.0 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure N**

    Wall Type   **External Wall**

**3.2. Construction Types for Exposure E**

    Wall Type   **External Wall**

    Door Type   **2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 147.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** ACH

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Floor Above Unconditioned Space**

    Floor Area   **147.0** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Unconditioned Space Max Temp.   **37.0** °C

    Ambient at Space Max Temp.   **41.0** °C

    Unconditioned Space Min Temp.   **12.0** °C

    Ambient at Space Min Temp.   **6.0** °C

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **25.0** m²

    U-Value   **0.700** W/(m²-°K)

    Uncondit. Space Max Temp   **37.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **12.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

    Partition Type   **Wall Partition**

    Area   **33.0** m²

    U-Value   **0.700** W/(m²-°K)

    Uncondit. Space Max Temp   **34.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **15.0** °C

    Ambient at Space Min Temp   **6.0** °C

**LV ROOM**

**1. General Details:**

    Floor Area   **177.0** m²

    Avg. Ceiling Height   **4.1** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **389.4** L/s

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **1000** W

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **0.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **26000.0** Watts

    Schedule   **Equipment**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| E | 25.0 | 0 | 0 | 1 |
| S | 40.0 | 0 | 0 | 0 |
| S | 71.3 | 0 | 0 | 0 |
| W | 25.0 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure E**

    Wall Type   **External Wall**

    Door Type   **2\*2.5**

**3.2. Construction Types for Exposure S**

    Wall Type   **External Wall**

**3.3. Construction Types for Exposure S**

    Wall Type   **External Wall**

**3.4. Construction Types for Exposure W**

    Wall Type   **External Wall**

    Door Type   **1 x 2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 177.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** ACH

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Floor Above Unconditioned Space**

    Floor Area   **177.0** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Unconditioned Space Max Temp.   **37.0** °C

    Ambient at Space Max Temp.   **41.0** °C

    Unconditioned Space Min Temp.   **12.0** °C

    Ambient at Space Min Temp.   **6.0** °C

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **23.0** m²

    U-Value   **0.700** W/(m²-°K)

    Uncondit. Space Max Temp   **37.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **12.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

**(No partition data).**

## Air System Sizing Summary for ELECT. BUILDING (CAPACITOR BANK)

**Air System Information**

    Air System Name   **ELECT. BUILDING**

    Equipment Class   **TERM**

    Air System Type   **SPLT-FC**

Number of zones   **1**

Floor Area   **33.0** m²

Location   **binak, IRAN**

**Sizing Calculation Information**

    Calculation Months   **Jan to Dec**

    Sizing Data   **Calculated**

Zone L/s Sizing   **Sum of space airflow rates**

Space L/s Sizing   **Individual peak space loads**

**Air System Information**

    Air System Name   **ELECT. BUILDING**

    Equipment Class   **TERM**

    Air System Type   **SPLT-FC**

Number of zones   **1**

Floor Area   **33.0** m²

Location   **binak, IRAN**

**Sizing Calculation Information**

    Calculation Months   **Jan to Dec**

    Sizing Data   **Calculated**

**Zone Sizing Data**

|  | **Maximum** |  |  |  | **Maximum** | **Zone** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cooling** | **Design** | **Minimum** |  | **Heating** | **Floor** |  |
|  | **Sensible** | **Airflow** | **Airflow** | **Time of** | **Load** | **Area** | **Zone** |
| **Zone Name** | **(kW)** | **(L/s)** | **(L/s)** | **Peak Load** | **(kW)** | **(m²)** | **L/(s-m²)** |
| Zone 1 | 13.2 | 684 | 684 | Jul 1500 | 0.5 | 33.0 | 20.74 |

**Terminal Unit Sizing Data - Cooling**

|  | **Total** | **Sens** | **Coil** | **Coil** | **Water** | **Time** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Coil** | **Coil** | **Entering** | **Leaving** | **Flow** | **of** |
|  | **Load** | **Load** | **DB / WB** | **DB / WB** | **@ 5.6 °K** | **Peak** |
| **Zone Name** | **(kW)** | **(kW)** | **(°C)** | **(°C)** | **(L/s)** | **Load** |
| Zone 1 | 14.6 | 13.0 | 30.9 / 20.2 | 15.1 / 14.1 | - | Jul 1500 |

**Terminal Unit Sizing Data - Heating, Fan, Ventilation**

|  |  | **Heating** | **Htg Coil** |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Heating** | **Coil** | **Water** | **Fan** |  |  | **OA Vent** |
|  | **Coil** | **Ent/Lvg** | **Flow** | **Design** | **Fan** | **Fan** | **Design** |
|  | **Load** | **DB** | **@11.1 °K** | **Airflow** | **Motor** | **Motor** | **Airflow** |
| **Zone Name** | **(kW)** | **(°C)** | **(L/s)** | **(L/s)** | **(BHP)** | **(kW)** | **(L/s)** |
| Zone 1 | 0.5 | 9.9 / 10.4 | - | 684 | 0.000 | 0.000 | 0 |

**Space Loads and Airflows**

|  |  | **Cooling** | **Time** | **Air** | **Heating** | **Floor** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Zone Name /** |  | **Sensible** | **of** | **Flow** | **Load** | **Area** | **Space** |
| **Space Name** | **Mult.** | **(kW)** | **Load** | **(L/s)** | **(kW)** | **(m²)** | **L/(s-m²)** |
| ***Zone 1*** |  |  |  |  |  |  |  |
| CAPACITOR ROOM | 1 | 13.2 | Jul 1500 | 684 | 0.5 | 33.0 | 20.74 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.A. COMPONENT LOADS FOR SPACE '' CAPACITOR ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 41.0 °C / 30.5 °C** | | | **HEATING OA DB / WB 6.0 °C / 6.0 °C** | | |
|  | **OCCUPIED T-STAT 30.0 °C** | | | **OCCUPIED T-STAT 10.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 49 m² | 266 | - | 49 m² | 126 | - |
| Roof Transmission | 33 m² | 267 | - | 33 m² | 69 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 3 m² | 145 | - | 3 m² | 70 | - |
| Floor Transmission | 33 m² | 0 | - | 33 m² | 45 | - |
| Partitions | 52 m² | 36 | - | 52 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 792 W | 792 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 10000 W | 10000 | - | 0 | 0 | - |
| People | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration | - | 498 | 1447 | - | 181 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 1200 | 145 | 10% | 49 | 0 |
| **>> Total Zone Loads** | **-** | **13205** | **1592** | **-** | **540** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.B. ENVELOPE LOADS FOR SPACE '' CAPACITOR ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **N EXPOSURE** |  |  |  |  |  |  |
| WALL | 32 | 0.642 | - | 133 | - | 82 |
| **E EXPOSURE** |  |  |  |  |  |  |
| WALL | 17 | 0.642 | - | 133 | - | 44 |
| DOOR | 3 | 5.800 | - | 145 | - | 70 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 33 | 0.522 | - | 267 | - | 69 |

## Air System Sizing Summary for ELECT. BUILDING (HV ROOM, LV ROOM)

**Air System Information**

    Air System Name   **ELECT. BUILDING(LV,HV)**

    Equipment Class   **SPLT AHU**

    Air System Type   **SZCAV**

Number of zones   **1**

Floor Area   **324.0** m²

Location   **binak, IRAN**

**Sizing Calculation Information**

    Calculation Months   **Jan to Dec**

    Sizing Data   **Calculated**

Zone L/s Sizing   **Sum of space airflow rates**

Space L/s Sizing   **Individual peak space loads**

**Central Cooling Coil Sizing Data**

   Total coil load   **94.4** kW

    Sensible coil load   **67.5** kW

    Coil L/s at Jul 1500   **3332** L/s

    Max block L/s   **3332** L/s

    Sum of peak zone L/s   **3332** L/s

    Sensible heat ratio   **0.711**

    m²/kW   **3.4**

    W/m²   **291.5**

    Water flow @ 5.6 °K rise   **N/A**

Load occurs at   **Jul 1400**

Load occurs at   **Jul 1500**

OA DB / WB   **41.0 / 30.5** °C

Entering DB / WB   **32.8 / 22.7** °C

Leaving DB / WB   **16.1 / 15.2** °C

Coil ADP   **14.2** °C

Bypass Factor   **0.100**

Resulting RH   **38** %

Design supply temp.   **16.9** °C

Zone T-stat Check   **1 of 1** OK

Max zone temperature deviation   **0.0** °K

**Supply Fan Sizing Data**

     Actual max L/s   **3332** L/s

    Standard L/s   **3328** L/s

    Actual max L/(s-m²)   **10.28** L/(s-m²)

**Outdoor Ventilation Air Data**

    Design airflow L/s   **708** L/s

    L/(s-m²)   **2.18** L/(s-m²)

Fan motor BHP   **6.96** BHP

Fan motor kW   **5.52** kW

Fan static   **994** Pa

**Zone Sizing Data**

|  | **Maximum** |  |  |  | **Maximum** | **Zone** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cooling** | **Design** | **Minimum** |  | **Heating** | **Floor** |  |
|  | **Sensible** | **Airflow** | **Airflow** | **Time of** | **Load** | **Area** | **Zone** |
| **Zone Name** | **(kW)** | **(L/s)** | **(L/s)** | **Peak Load** | **(kW)** | **(m²)** | **L/(s-m²)** |
| Zone 1 | 52.8 | 3332 | 3332 | Jul 1600 | 1.7 | 324.0 | 10.28 |

**Zone Terminal Sizing Data**

No Zone Terminal Sizing Data required for this system.

**Space Loads and Airflows**

|  |  | **Cooling** | **Time** | **Air** | **Heating** | **Floor** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Zone Name /** |  | **Sensible** | **of** | **Flow** | **Load** | **Area** | **Space** |
| **Space Name** | **Mult.** | **(kW)** | **Load** | **(L/s)** | **(kW)** | **(m²)** | **L/(s-m²)** |
| ***Zone 1*** |  |  |  |  |  |  |  |
| LV ROOM | 1 | 33.4 | Aug 1600 | 2112 | 1.0 | 177.0 | 11.93 |
| HV ROOM | 1 | 19.3 | Jul 1600 | 1220 | 0.7 | 147.0 | 8.30 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.A. COMPONENT LOADS FOR SPACE '' LV ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Aug 1600** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 40.6 °C / 30.4 °C** | | | **HEATING OA DB / WB 6.0 °C / 6.0 °C** | | |
|  | **OCCUPIED T-STAT 30.0 °C** | | | **OCCUPIED T-STAT 10.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 154 m² | 924 | - | 154 m² | 395 | - |
| Roof Transmission | 177 m² | 1346 | - | 177 m² | 370 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 8 m² | 356 | - | 8 m² | 174 | - |
| Floor Transmission | 177 m² | 501 | - | 177 m² | 0 | - |
| Partitions | 23 m² | 80 | - | 23 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 1200 W | 1200 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 26000 W | 25999 | - | 0 | 0 | - |
| People | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 3041 | 0 | 10% | 94 | 0 |
| **>> Total Zone Loads** | **-** | **33447** | **0** | **-** | **1033** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.B. ENVELOPE LOADS FOR SPACE '' LV ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **E EXPOSURE** |  |  |  |  |  |  |
| WALL | 20 | 0.642 | - | 150 | - | 51 |
| DOOR | 5 | 5.800 | - | 237 | - | 116 |
| **S EXPOSURE** |  |  |  |  |  |  |
| WALL | 40 | 0.642 | - | 224 | - | 103 |
| **S EXPOSURE** |  |  |  |  |  |  |
| WALL | 71 | 0.642 | - | 399 | - | 183 |
| **W EXPOSURE** |  |  |  |  |  |  |
| WALL | 23 | 0.642 | - | 150 | - | 58 |
| DOOR | 3 | 5.800 | - | 119 | - | 58 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 177 | 0.522 | - | 1346 | - | 370 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.A. COMPONENT LOADS FOR SPACE '' HV ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1600** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 40.6 °C / 30.4 °C** | | | **HEATING OA DB / WB 6.0 °C / 6.0 °C** | | |
|  | **OCCUPIED T-STAT 30.0 °C** | | | **OCCUPIED T-STAT 10.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 68 m² | 358 | - | 68 m² | 175 | - |
| Roof Transmission | 147 m² | 1213 | - | 147 m² | 307 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 5 m² | 237 | - | 5 m² | 116 | - |
| Floor Transmission | 147 m² | 416 | - | 147 m² | 0 | - |
| Partitions | 58 m² | 144 | - | 58 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 1200 W | 1200 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 14000 W | 13999 | - | 0 | 0 | - |
| People | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 1757 | 0 | 10% | 60 | 0 |
| **>> Total Zone Loads** | **-** | **19326** | **0** | **-** | **658** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.B. ENVELOPE LOADS FOR SPACE '' HV ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **N EXPOSURE** |  |  |  |  |  |  |
| WALL | 48 | 0.642 | - | 200 | - | 123 |
| **E EXPOSURE** |  |  |  |  |  |  |
| WALL | 20 | 0.642 | - | 158 | - | 51 |
| DOOR | 5 | 5.800 | - | 237 | - | 116 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 147 | 0.522 | - | 1213 | - | 307 |

**PSYCHROMETRIC CHART FOR LV ROOM, HV ROOM IN ELECT. BUILDING:**



**Equipment Selection:**

**EXHAUST FANS (22-EF-01 is existing)**

D02

|  |  |  |
| --- | --- | --- |
| Equipment No: | 22-EF-01 | 22-EF-02 |
| Quantity | 1 | 1 |
| Type | WALL MOUNTED | WALL MOUNTED |
| Flow Rate (L/S) | 278  (ACH-10 , A:25 , H:4.1m) | 220  (ACH-6 ,A:28.5m2 , H:4.1m) |
| Static Pressure | 15 pa | Sand trap louver: 6mmh2o=57pa  Exhaust Air Louver:  38 pa  →100 pa |
| Service Area | Battery Room | CO2 Room |
| Remarks | Existing in battery room |  |

Battery Room Exhaust Fan:

Air Flow Rate: Area:25, H:4.1 with considering ACH:10 → Air Flow Rate is almost 1000 /hr

Wall mounted Ehaust fan Pressure drop: 15 pa (this fan is existing and exhaust outside directly)   
  
  
  
CO2 Room Exhaust Fan:

Air Flow Rate: Area:28, H:4.1 with considering ACH:6 → Air Flow Rate is almost 690 /hr≈192 L/S

A Wall mounted Ehaust fan with 220 L/S has selected.

Pressure drop:

as said in Sand Trap Louver selection this equipment pressure drop is 57pa

Exhaust Air Louver pressure drop is 38 pa → Ehaust fan Pressure drop: 100 pa

**package unit(package unit is existing):**

|  |  |  |
| --- | --- | --- |
| PACHAGE UNIT SCHEDULE | | |
| PERFORMANCE | TAG NO: PU-02-01 , PU-02-02 | |
| COOLING CAPACITY: 53400 KCAL/HR | |
| NOMINAL TONNAGE: 25 TON | |
| SUPPLY AIR:12000 CMH –FRESH AIR :2550 CMH | |
| SUMMER | AIR TEMP DEG. :80.5/68.8  LEAVING TEMP:57.7/56.6 |
| ELEC. DATA | 400-3-50 | |
| PHYSICAL DATA | DIMENSIONS:5200×2000×174 mm | |
| OPERATING WEIGHT=1970 kg | |
| DESIGNATION & QUANTITY | P.U-2 QTY=1 | |
| MAX. AMBIENT TEMP= 125 | |
| COM. DATA | POWER=25HP 400-3-50 | |
| THR=75450 KCAL/HR | |
| CONDENSER DATA | QTY=2 | |
| HP=3 HP | |
| FAN DATA | ELECT-400-3-50 | |
| RPM=1450 ELECT-400-3-50 | |
| MODEL | SIMILAR TO SARAN P.U MODEL SPAR 25-1 ROOF TOP | |
| QUANTITY | QTY=2 ONE AS STANDBY | |

**SPLIT TYPE D-X AIR CONDITIONER**

**Capacitor Bank:**

Design Actual Sensible Cooling Load : 13205 W

Design Actual Latent Cooling Load : 1592W

Design Total Cooling Load : 13205+1592=14797 W=50500 btu/hr

**Equipment selection:**

Indoor Unit Equipment No: 22-SUI-04

Quantity: 1

Total EQ. Cooling Load : 36900 btu/hr→1×48000 btu/hr nominal capacity

(nominal capacity will be checked by vendor according to ambient temperature)

Type : DUCTED SPLIT (Tropical)

Outdoor Unit Equipment No: 22-SUO-04

Quantity: 1

50500 btu/hr - 36900 btu/hr = 13600 btu/hr→1×18000 btu/hr nominal load-wall mounted split unit

(nominal capacity shall be checked by vendor according to ambient temperature)

Indoor Unit Equipment No: 22-SUI-03

Quantity: 1

Type : wall mounted (Tropical)

Outdoor Unit Equipment No: 22-SUO-03

**SAND TRAP LOUVER**

**Capacitor Bank Sand Trap Louver:**

According to “**Shahrokhi Manufacturing co.**“ catalogue for Sand Trap Louver:

= Face Velocity in FPM

= effective free area in square feet = CFM/FPM

Pressure Drop = 6mmH2O ≈ 57 pa ≈ 0.23 in.wg

Air Flow Rate: 100 l/s

from “**Shahrokhi Manufacturing co.**“ catalogue for Sand Trap Louver:

if 0.23 in.wg Pressure Drop → =343 FPM

Air Flow Rate: 100 l/s ≈ 211 CFM →

=211/343=0.615 → W=24” & H=12”

**Co2 Room Sand Trap Louver:**

Pressure Drop = 6mmH2O ≈ 57 pa ≈ 0.23 inwg

Air Flow Rate: 220 l/s

from “**Shahrokhi Manufacturing co.**“ catalogue for Sand Trap Louver:

0.23 inwg Pressure Drop → =343 FPM

Air Flow Rate: 220 l/s ≈ 466 CFM → =464/343=1.36 → W=36” & H=18”  
  
  
  
**HIGH VOLTAGE ROOM and LOW VOLTAGE ROOM:**

**FROM HAP4.9: Central Cooling Coil Sizing Data:**

    Total coil load   **26.9** Tons

    Total coil load   **322.3** MBH

    Sensible coil load   **229.2** MBH

    Coil CFM at Jul 1500   **7060** CFM

    Max block CFM   **7060** CFM

    Sum of peak zone CFM   **7060** CFM

    Sensible heat ratio   **0.711**

    ft²/Ton   **129.9**

    BTU/(hr-ft²)   **92.4**

    Water flow @ 10.0 °F rise   **N/A**

Existing Package Unit Cooling Capacity = 53400 kcal/hr ≈ 17.66 ton

Total Cooling Load – Package Unit Cooling Capacity = 26.9 – 17.66 = 9.24 ton

LV & HV Split units new loads = 9.24 ton

|  |  | **Cooling** | **Time** | **Air** | **Heating** | **Floor** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Zone Name /** |  | **Sensible** | **of** | **Flow** | **Load** | **Area** | **Space** |
| **Space Name** | **Mult.** | **(MBH)** | **Load** | **(CFM)** | **(MBH)** | **(ft²)** | **CFM/ft²** |
| ***Zone 1*** |  |  |  |  |  |  |  |
| LV ROOM | 1 | 114.1 | Aug 1600 | 4475 | 3.5 | 1905.2 | 2.35 |
| HV ROOM | 1 | 65.9 | Jul 1600 | 2585 | 2.2 | 1582.3 | 1.63 |

HV load Ratio= = ≈ 0.366

D02

HV load = 0.366 ×9.24 ton = 3.38 ton ≈ 40580 btu/hr

HV load ÷ Quantity = 40580 btu/hr ÷ 2 = 20290 btu/hr (Actual Capacity) →2×24000 btu/hr nominal load-wall mounted split unit.

**Equipment selection:**

Indoor Unit Equipment No: 22-SUI-02A,B

Quantity: 2

Type : Wall Mounted (Tropical)

Outdoor Unit Equipment No: 22-SUO-02A,B

Quantity: 2

LV load (actual) = 9.24 ton – 3.38 ton = 5.86 ton ≈ 70320 btu/hr

LV load ÷ Quantity = 70320 btu/hr ÷ 4 = 17580 btu/hr (actual) →4×24000 btu/hr nominal load-wall mounted split unit.

**Equipment selection:**

Indoor Unit Equipment No: 22-SUI-01A,B,C,D

Quantity: 4

Type : Wall Mounted (Tropical)

Outdoor Unit Equipment No: 22-SUO-01A,B,C,D

Quantity: 4